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Institutional Investors and Public Authority Ownership Impact on Green Bonds Issue: Evidence from France

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ABSTRACT
Green bonds are one of the most significant financial innovations to address the impacts of climate change and to help companies and governments to finance their ecological transition. The green bond market has been growing rapidly worldwide since its debut in 2007. In this paper, we present the first empirical study on the effects of ownership structure on green bond issuance by firms in France from 2013 to 2019. After compiling a comprehensive green bond dataset, we used legitimacy, stakeholders, and slack resources theories to investigate institutional investors and public authority ownership impact on green bond issuance. Our results confirm the heterogeneity of institutional
investors and highlight a positive relation between insurance company and public authority ownership and green bond issuance.

**KEYWORDS:** Green Bonds, Institutional Investor, Pension Funds, Life Insurance

**JEL CODES:** G39, H1, C13

With the enactment of the French law of 2015 relating to the energy transition for green growth (COP 21), many companies and investors became aware of global warming issues. Mainstream economics defend the concept of green growth and consider that manufacturers are the most relevant actors to develop innovative solutions and cleaner production that could address the challenges of climate change (Debref, 2017). The financial sector is innovating to adapt to new constraints related to the energy transition and finance innovative initiatives for sustainability. One of the innovative products resulting from this environmental awareness is the “green bond,” a financial loan issued on the market. Unlike a classic bond, it is used only to finance projects with environmental benefits. At the start of 2017, France took a decisive step towards energy transition by launching its first “green” sovereign bond to finance ecological investments. Green finance products have rapidly grown in number, driven by demand from institutional and retail investors – that will increasingly integrate environmental, social, and governance (ESG) considerations within their fiduciary duty. Article 2c of the Paris Agreement signed in December 2015 explicitly involves the financial sector “making finance flow consistent with a pathway towards low greenhouse gas emissions and climate-resilient development.” The capital market through green bonds can play an essential role in attracting capital to finance these requirements.

According to the International Capital Market Association (2018), the green bond is “any bond instrument where the proceeds will be exclusively applied to finance or refinance in part or in full new and/or existing eligible green projects”. Green bond funds allow individual investors to assign an environmental benefit to their bond investments. They are intended to have a positive environmental benefit, such as preventing pollution. Moreover, they are certified by third parties who must verify that the proceeds are funding projects that generate environmental benefits. For first-time issuers, the process of issuing green bonds can be cumbersome, with administrative and compliance costs.

By publishing its action plan for sustainable finance on March 8th 2018, the European Commission announced its ambition to support European financial markets towards a lower-carbon economy. The roadmap, primarily inspired by a report on sustainable finance that it had established by the High-Level...
Expert Group (HLEG), focused on ten related actions aiming to redirect capital flows towards a more sustainable economy and strengthen transparency and sustainable investments. Action 10 of the European Commission plan deserves special attention because it emphasizes the need to mitigate short-termism in the capital markets, on the one hand, and promote more sustainable corporate governance, on the other. In both cases, it calls for changes in corporate governance practices. Action 10 aims to establish, within societies, governance “more conducive to sustainable investments” and suggests the obligation for boards to develop a “sustainable growth strategy” or clarify the rules under which directors should act in the long term.

This paper addresses the French context. France is a country of civil law. In line with La Porta et al. (2000, 1997, 1998), many studies affirm the superiority of the Anglo-Saxon common law system over the French civil law system. Thus, common law countries would better protect investors (La Porta et al., 2000), have more developed equity markets and financial intermediaries (La Porta et al., 1997), include companies with more dispersed shareholders (La Porta et al., 1999, 1998) and pay higher dividends (La Porta et al., 2000).

A country’s legal tradition influences investor protection and the quality of the judicial system. Financial development and shareholding dispersion are higher when the investors are strongly protected, and the application of the law is equitable. The common tradition is more oriented towards the defense of private interests and better protects financial investors than the civil law tradition. Common law countries have more developed financial markets and financial intermediaries than countries with a civil law tradition (those under French civil law).

At the national level, France adopted a legislative framework that includes corporate social responsibility (CSR). Article 116 of the law of May 15th 2001, relating to new economic regulations, requires that listed companies include information about their activities’ social and environmental consequences in their annual report up to May 22nd 2019. These regulations relating to the growth and transformation of companies are known as the Pacte law (Action plan for the growth and transformation of companies). It is about adapting the French business model to the realities of the 21st century. Therefore, the law revolves around three axes: 1) freeing companies, 2) increasing their capacity for innovation, and 3) ensuring justice regarding society. It is the bridge towards transforming the business model to contemporary challenges, including sustainability. Companies are now obliged to consider social and environmental issues in managing their activities.
The objective of this study is to examine the relationship between different institutional investors and government ownership when issuing green bonds, given the heterogeneous nature of institutional investors by type (bank, mutual funds, insurance company). More specifically, we are looking for answers to two questions:

1. Do institutional investors equally affect the issuance of green bonds?
2. Does State ownership encourage the company to issue green bonds?

To develop the conceptual framework of the study and based on the work of Maltais and Nykvist (2020), we use the literature on CSR and socially responsible investment (SRI) (Campbell, 2007; Fernando, Lawrence, 2014; Greenwood et al., 2011; Kurucz et al., 2008; Strand et al., 2015). This literature explains the growth of the green bond market; it provides a large body of theoretical and empirical studies that examine the reasons behind organizations engaging in sustainability, social and environmental responsibility beyond what is required by law and regulation.

In this paper, we do not conceptualize the issuance of green bonds as identical to SRI and CSR. We use work on CSR and SRI to develop a theoretical framework that distinguishes two types of motivations for engagement in sustainable development practices: 1) long-term financial benefits (based on stakeholders’ and slack resources theories) and 2) organizational legitimacy. Accordingly, the impact of institutional ownership will be positive if the institutional ownership mitigates agency problems by promoting the optimal allocation of firm resources and monitoring managerial actions. However, this impact will be harmful if the institutional ownership stimulates the conflict between shareholders and non-investing stakeholders.

We provide the first comprehensive empirical study on the impact of institutional ownership on green bonds issuance considering the heterogeneity of those investors. We applied logistic regression and Partial Least Squares regression (PLS) on the 40 largest French firms (CAC 40). Despite the recent boom in the green bond market, there are still no studies that explain the corporate decision to issue those new financial instruments. Our findings will provide a better understanding of the complex nature of institutional investors and their different environmental performance requirements in the context of heterogeneous institutional investors.

This study contributes to the literature in the following ways:

1. It presents a better understanding of the relationship between institutional investors and the environmental behavior of companies. It provides further evidence that different types of institutional investors have different levels of environmental requirements. Specifically, our results reveal that the knowledge on the impact of institutional investors on
CSR, which previous studies have documented, is primarily concerned with the heterogeneous nature of institutions.

2. Our findings contribute to the literature analyzing CSR or ESG from the perspectives of institutional investors (e.g., Buchanan et al., 2018; Dimson et al., 2015; Dyck et al., 2019; Hoepner et al., 2018; Krueger et al., 2020). Dimson et al. (2015) show that active institutional investors engaging in environmental or social issues benefit from improved accounting performance and increased institutional ownership. Buchanan et al. (2018) explain that influential institutional ownership can impact the relation between CSR and firm value in two opposing ways.

3. This study provides an understanding of the relationship between State ownership and the company’s environmental behavior. This relationship will explain how the government affects the company’s environmental behavior through channels different from law and taxes.

The rest of this paper is organized as follows. Section 2 provides the theoretical background and presents hypotheses. Section 3 presents the data and methodology. Section 4 provides and discusses the empirical results. Section 5 concludes the paper.

**Theoretical Background**

The stakeholder theory has gradually established itself as the frame of reference in Anglo-Saxon literature on CSR and sustainability practices. According to Freeman (2010), many changes and turbulence have occurred in the organization’s external environment. It is essential for business leaders to adapt and evolve their managerial practices. Freeman (2010) offers leaders to rebuild their relationships with suppliers, customers, shareholders, employees, environmentalists, and other interest groups. These different actors are grouped under the label of “stakeholders”. Freeman defines them as “a group or an individual who is affected or who can affect the achievement of the objectives of the organization.” By taking a stakeholder approach, business leaders are better able to manage their organizations to achieve better results. Otherwise, the company will face hazards that hamper its activity (social uprisings, strikes, legal proceedings, boycotts, etc.).

According to this theory, if the company does not behave in a socially responsible manner, stakeholders with implicit contracts with the company, such as environmental groups, may attempt to transform their implicit claims into explicit claims that are more costly to the company (McGuire et al., ...
Therefore, the socially and environmentally responsible business will have lower implied claim costs and better financial performance than other companies (McGuire et al., 1988). In addition to stakeholders’ theory, slack resources theory could explain a positive relationship between environmental and financial performance. According to this theory, economic performance is likely to influence the company’s actions and social policies. The availability of resources (financial or otherwise) that potentially results from better financial performance provides businesses with the opportunity to invest in areas of social performance, such as community relations, employee relations, or the environment (Waddock, Graves, 1997). If resources are available, a better allocation of these resources in the social fields will generate higher performance.

Legitimacy, a central concept in institutional theory, is defined differently. The definition by Suchman (1995) is widely accepted: “the actions of an entity which are appropriate in a socially constructed system of norms, values, beliefs and definitions”. These systems can be explicit or implicit, so it is not enough that companies simply obtain legal or market requirements. Still, they must also conform to the prevailing standards and values of the company (Alrazi et al., 2015). Stakeholders often assess the level of legitimacy of an entity based on their own perceptions; these stakeholders typically include investors, customers, the community, the public, and regulators (Bansal, Clelland, 2004). Lack of legitimacy will cause harmful acts of various stakeholders. When a company engages in environmental or social violations, creditors can charge higher interest rates, consumers can refuse to buy its products or services, investors can sell its inventory, the government can increase fees or even force it to cease operations, and the public can engage the media to create legitimate pressure on the company (Alrazi et al., 2015). Any will endanger and even impact its survival, particularly for environmentally sensitive companies (Bansal, Clelland, 2004; Pellegrino, Lodhia, 2012; Sass, 2008).

In our theoretical framework, we grouped legitimacy, stakeholder, and slack resources theories as a set to predict similar motivations for engaging with sustainability. In fact, those theories are mainly complementary. Common to legitimacy, stakeholders, and slack resources is the idea that organizations face incentives to conform to norms and expectations imposed by external and internal stakeholders.

The rise of institutional investors is an unquestionable fact underlined by a voluminous amount of research (Gillan, Starks, 2003; Brav et al., 2008; Jara-Bertin et al., 2012; Denes et al., 2017). Institutional investors have the requisite skills to better access information (McConnell, Servaes, 1990) and ensure sound management (Coffee, 1991). They are thus the best candidates...
to monitor the management, encourage them to innovate and focus on long-term investments (Kochhar, David, 1996), reduce information asymmetry (Johnson et al., 2010), and solve agency problems (Cornett et al., 2007). Based on the fact that environmental investment can provide valuable products market differentiation and coverage against event risk (Servae, Tamayo, 2013; Hong et al., 2019; Albuquerque et al., 2019; Lins et al., 2017), it is quite natural for institutional investors to consider their effects.

It appears that the establishment of better long-term-oriented governance mechanisms will be encouraged by institutional investors, prompting the HLEG group of experts to make some recommendations for these participants. Thus, the report recommended an extension of the principle of fiduciary duty to institutional investors through the development of long-term responsible management policies (called “stewardship”) or the exercise of their voting rights, for example. Finally, it encouraged more systematic consideration of environmental and social risks in investment policies. These recommendations were addressed by the European Commission in Action 7, which aims to clarify the duties and responsibilities of investors and asset managers. Therefore, it is essential to ask how institutional investors perceive and react to the green bond issue.

In addition, the side effects in economics can be particularly favorable or unfavorable regarding the institution’s purpose. For example, considering a climate drift is indisputably an essential element for a damage insurer, and even more for a reinsurer, because, in this case, the liabilities as the assets of the portfolio will be impacted by the consequences of natural accidents made worse by global warming. Similarly, an entity whose activity is linked to health, such as a provident institution, will be affected by pollution or well-being at work, which will have consequences on public health and, therefore, its sector of activity. In other words, the mode of management of institutional investors and their behavior varies according to the context, objectives, and constraints (Brickley et al., 1988; Schneider, Ryan, 2011; Sahut, Gharbi, 2011).

Empirical results show that the effect of CSR on company value varies with the level of influential institutional ownership. Hoepner et al. (2018) examined institutional investor engagements in ESG issues and found that such engagements can benefit the firm by reducing the downside risk. Investors with a longer investment horizon prefer to hold high ESG firms and behave more patiently when incurring a loss. Dyck et al. (2019) investigated a sample of 3277 firms from 41 countries during the period 2004-2013 and showed that institutional investors drive the firm-level environmental and social performance worldwide. According to Krueger et al. (2020), institutional investors believe climate risks have financial implications for their portfolio and that
these risks, particularly regulatory risks, have already begun to materialise. Many investors, especially the long-term, more prominent, and ESG-oriented ones, consider risk management and engagement, rather than divestment, to be a better approach for addressing climate risks.

Hypothesis 1. The probability of green bond issuance is related to institutional investors’ ownership.

Hypothesis 2. Institutional investors’ ownership of green bond issuance varies depending on institutional investor type (insurance, mutual and pension funds, banks).

According to Viallet-Thévenin (2019), the State shareholder brings together economic governance practices and techniques that allow the State to exercise control over the company (primarily through the turnover) and generate income (payment of dividends or capital gains on disposal). Therefore, equity acquisition is a public policy instrument (Halpern et al., 2014) and a financial instrument.

State ownership is an essential characteristic of French companies, particularly privatized entities. The State can be expected to be a substantial shareholder and politically sensitive because the activities of these companies are more in the public eye. This is because government ownership indirectly means that the public owns the company. This type of company can engage in more sustainable activities (green projects) and issue green bonds. In France, several agencies and public administrations manage State holdings: The State Participation Agency (APE), the Caisse des Dépôts and finally, its subsidiary, the Public Investment Bank (BPI). However, the State also takes holdings through other entities, such as the French Development Agency, which invests in companies abroad (through its subsidiary dedicated to the private sector), or regional institutions such as the European Investment Bank (Viallet-Thévenin, 2019).

The participation in company capital is an essential component of relations between the State and the economy and the “economic regime of the political order” (Gayon, Lemoine, 2014). The Macron law for growth, activity, and equal economic opportunities on August 6th 2015, could not forget public companies. Their economic weight is significant (State holding amount to 110 billion euros). The State’s influence on these companies can appear as a lever of valuable growth for the economic conditions. Thus, in Title II, “Investing” of the law, Chapter II is entitled “Enterprises with public participation.” The classic view of national companies managing extensive French-style public services in the context of a managed economy must, however, be set aside. The nationalization of 1946 or 1982 is no longer the paradigm of the State shareholder. Semantically, moreover, this evolution is
visible. Where the terms “public enterprise,” “nationalization,” or “privatization” would have been used, the Macron law uses the terms “enterprises” or “companies” with public participation and “transfer of part of the capital to the private sector.” The State can be expected to be an active shareholder and push firms for better environmental behavior because the activities of these companies are more exposed to media and the public.

The assumption is as follows:

*Hypothesis 3.* The issuance of green bonds is positively associated with the State shareholding (public authority, the government).

**Methodology and Data**

**Data and Variables**

Our sample is based on the company belonging to the CAC 40 index for the period from 2013 to 2019 (7 years in total). We have removed from the initial sample companies with missing data and financial firms. Our final sample contain 37 company. The dependent variable is related to the issuance of green bonds. It is a binary variable that takes the value 1 if the company issues green bonds and 0 otherwise. We manually collected this data from the company’s annual reports. We collect institutional and public authority ownership (percentage of direct shares detention) data from Orbis database. We included institutional ownership in our work as the percentage of shares held by institutional investors. We collect the percentage of shares held by three types of institutional investors: Bank, Insurance, Mutual and pension funds. Also, by lagging the independent variables by 1 year, we take into account the reverse causality problem following Allison (2009) recommendation.

In our regressions, we control for the firm size because it may be that big firms engage in more environment-friendly activities, leading to potential omitted variable bias in our regressions and incorrect inferences. Firm size is measured by total assets (Orbis). To measure the financial and accounting performance of firms, we use return on assets ratio from Orbis database. We also control for the leverage. Table 1 presents variables definition and Tables 2 and 3 report respectively descriptive statistics and correlation matrix.
Table 1 – Variables definitions (data was collected from Orbis database)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green bond</td>
<td>It is a binary variable: it takes the value 1 if the company issue green bonds and 0 otherwise. Collected by hand from the company’s reports.</td>
</tr>
<tr>
<td>Bank</td>
<td>The percentage of shares held by banks. Collected from Orbis database.</td>
</tr>
<tr>
<td>Mutual funds</td>
<td>The percentage of shares held by mutual or pension fund. Collected from Orbis database.</td>
</tr>
<tr>
<td>Insurance company</td>
<td>The percentage of shares held by Public authority companies. Collected from Orbis database.</td>
</tr>
<tr>
<td>Public authority State</td>
<td>The percentage of shares held by insurance companies Collected from Orbis database.</td>
</tr>
<tr>
<td>ROA</td>
<td>ROA is calculated by dividing a company’s net income by total assets. Collected from Orbis database.</td>
</tr>
<tr>
<td>Size</td>
<td>Measured by total assets. Collected from Orbis database.</td>
</tr>
<tr>
<td>Leverage</td>
<td>Debt-to-Equity Ratio = Total Debt / Total Equity. Collected from Orbis database.</td>
</tr>
</tbody>
</table>

Table 2 – Descriptive statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Min</th>
<th>Mean</th>
<th>Max</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Green bond</td>
<td>0</td>
<td>0.134</td>
<td>1</td>
<td>0.341</td>
</tr>
<tr>
<td>Bank</td>
<td>0</td>
<td>7.533</td>
<td>27.47</td>
<td>4.368</td>
</tr>
<tr>
<td>Insurance company</td>
<td>0</td>
<td>2.177</td>
<td>20.7</td>
<td>3.422</td>
</tr>
<tr>
<td>Mutual funds</td>
<td>0</td>
<td>2.439</td>
<td>29.72</td>
<td>3.622</td>
</tr>
<tr>
<td>Public authority State</td>
<td>0</td>
<td>4.341</td>
<td>85.14</td>
<td>10.441</td>
</tr>
<tr>
<td>ROA</td>
<td>-5.16</td>
<td>6.202</td>
<td>30.34</td>
<td>5.487</td>
</tr>
<tr>
<td>Size</td>
<td>10.634</td>
<td>17.293</td>
<td>19.66207</td>
<td>1.564</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.935</td>
<td>86.184</td>
<td>458.8985</td>
<td>73.889</td>
</tr>
</tbody>
</table>
### Table 3 - Correlation matrix

<table>
<thead>
<tr>
<th></th>
<th>Green bond</th>
<th>Bank</th>
<th>Insurance company</th>
<th>Mutual funds</th>
<th>Public authority State</th>
<th>ROA</th>
<th>Size</th>
<th>Leverage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Green bond</strong></td>
<td>1.0000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bank</strong></td>
<td>-0.074</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Insurance company</strong></td>
<td>0.062</td>
<td>0.062</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mutual funds</strong></td>
<td>-0.0685</td>
<td>0.071</td>
<td>0.056</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Public authority State</strong></td>
<td>0.360*</td>
<td>-0.178*</td>
<td>-0.084</td>
<td>-0.073</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ROA</strong></td>
<td>-0.160*</td>
<td>0.029</td>
<td>0.179*</td>
<td>0.009</td>
<td>-0.165*</td>
<td>1.000</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>0.191*</td>
<td>-0.038</td>
<td>-0.254*</td>
<td>-0.028</td>
<td>0.236*</td>
<td>-0.318*</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td><strong>Leverage</strong></td>
<td>0.303*</td>
<td>-0.068</td>
<td>-0.156*</td>
<td>-0.010</td>
<td>0.236*</td>
<td>-0.499*</td>
<td>0.292*</td>
<td>1.0000</td>
</tr>
</tbody>
</table>

Notes: P-value in parentheses. *p<0.10. **p<0.05. ***p<0.01.
Logistic Regression

Logit model is a convenient and frequently used tool in different business disciplines, such as finance (Jabeur, 2017; Jabeur, Fahmi, 2018), marketing (Siriwardena et al., 2012; Ma, Sun, 2020), human resources (Hautzinger, 1978; Sarker et al., 2020). Logistic regression is a model in which the explained variable can take only two modalities (dichotomous variable, or binary, generally coded 0 and 1). In the baseline model, we estimate a regression with Green bond as the dependent variable and proxies as independent variables. We also include a set of control variables (SIZE, ROA, LEVRAGE). The estimated outcome as expressed as follows:

\[
\hat{y} = \log \left( \frac{\pi(x)}{1 - \pi(x)} \right) = \beta_0 + \beta_1 x_1 + \cdots + \beta_k x_k
\]

In the case of univariate dichotomous models, several estimation methods are possible. The method most commonly used when the law of disturbances is the maximum of likelihood. Obtaining the maximum likelihood estimator implies the resolution of a system of k non-linear equations. The resolution of such a system can only be done with the help of econometric software that is usually built using digital algorithms.

Partial Least Square Discriminant Analysis

The use of partial least squares (PLS) is gaining more attention in social science such as marketing (Danks et al., 2020; Dash, Paul, 2021), information systems (AlNuaimi et al., 2021; Barrett et al., 2021) and finance (Jabeur, 2017; Jabeur et al., 2021; Sghaier et al., 2018). PLS univariate regression is a model that links a dependent variable y to a collection of independent variables. It is possible to choose the significant explanatory variables to include in PLS regression and the number of PLS components to keep by using the statistical tests associated with linear regression. A partial least squares discriminant analysis is used in this work (PLS-DA). According to the function this algorithm can be expressed as follows:

\[
Z = \sum_{h=1}^{m} W_h T_h
\]

where \(W_h\) are the estimated coefficients by discriminant analysis, \(m\) is the number of components and \(T_h\) are the PLS components.

In PLS regression, The Variable Importance in the Projection (VIP) metric enables us to categorize variables \(X_i\) based on their explanatory power of \(Y\). Independent variables with a high VIP (>0.8) are the most important
contribution in the construction of Y (Jabeur et al., 2021). PLS for classification overcomes both the theoretical and the practical limits of logistic regression and discriminant analysis (Stocchero et al., 2021). Indeed, probabilities are calculated directly from predictors, model interpretation is carried out with the whole model, and the connections with PLS are well-defined.

**Results**

**Logistic Regression**

Table 4 presents the results of the logistic regression. The first factor we are interested in is institutional investors’ ownership. The impact of this variable varies by institutional type: it is significant only for “insurance”. Thus, the results show that the increase in shares held by insurance institutional investors increases the probability of green bond issuance. This verdict, unlike our first hypothesis (H1) that all institutional investors impact positively the green bond issuance. The first possible explanation is that institutional investors are not a homogeneous group which confirm (H2). The second explanation is that insurance companies are more vulnerable to climate change (Nagaichuk et al., 2020). In 2017, after the devastating passage of cyclone Irma and Maria on Saint-Martin, Saint-Barthélemy, Martinique and Guadeloupe, insurers recorded 33,000 claims for a total cost estimated at 910 million euros and a final cost that could reach 2 billion euros (Le Monde, AFP, 2017). The French insurance association AFA (2015) study sheds light on the increasing cost of natural hazards in France over the next 25 years. It shows that the additional cost caused by material damage caused by the climate by 2040 is estimated at 44 billion euros (in constant euros), an increase of 90% compared to the amount of cumulative damage of the previous 25 years (Fédération Française de l’Assurance, 2015). From 48 billion euros over the period 1988-2013, natural hazards could cost 92 billion euros within 25 years. In spring 2017, the Sustainable Development Commission and the Economic and Financial Commission of the FFA (French Insurance Federation) created a working group to assess the inclusion of ESG-Climate criteria in the investment strategies of insurers and to define recommendations of the place. The results of the work bear witness to the profession’s commitment to the challenges of sustainable development.
Table 4 - Logistic regression results

<table>
<thead>
<tr>
<th>Variables</th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pooled logit regression clustered</td>
<td>Pooled logit regression clustered</td>
<td>Pooled logit regression clustered</td>
<td>Pooled logit regression clustered</td>
<td>Pooled logit regression clustered</td>
</tr>
<tr>
<td>Bank</td>
<td>-0.009</td>
<td>(0.901)</td>
<td>-0.026</td>
<td>(0.736)</td>
<td></td>
</tr>
<tr>
<td>Bank(_{t-1})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insurance company</td>
<td>0.2373***</td>
<td>(0.001)</td>
<td>0.321***</td>
<td>(0.001)</td>
<td></td>
</tr>
<tr>
<td>Insurance company(_{t-1})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual funds</td>
<td>-0.017</td>
<td>(0.857)</td>
<td>-0.060</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual funds(_{t-1})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Public authority State</td>
<td>0.050*</td>
<td>(0.610)</td>
<td>0.026**</td>
<td>(0.094)</td>
<td></td>
</tr>
<tr>
<td>Public authority State(_{t-1})</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ROA</td>
<td>-0.024</td>
<td>(0.784)</td>
<td>-0.026</td>
<td>(0.771)</td>
<td>-0.157*</td>
</tr>
<tr>
<td>Size</td>
<td>0.551</td>
<td>(0.283)</td>
<td>0.5535</td>
<td>(0.299)</td>
<td>1.185**</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.009**</td>
<td>(0.038)</td>
<td>0.009*</td>
<td>(0.075)</td>
<td>0.0003</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(0.038)</td>
<td></td>
<td>(0.075)</td>
<td></td>
</tr>
<tr>
<td>Variables</td>
<td>(1)</td>
<td>(2)</td>
<td>(3)</td>
<td>(4)</td>
<td>(5)</td>
</tr>
<tr>
<td>--------------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td></td>
<td>(0.004)</td>
<td>(0.004)</td>
<td>(0.007)</td>
<td>(0.009)</td>
<td>(0.000)</td>
</tr>
<tr>
<td>Year Effect</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>Yes</td>
</tr>
<tr>
<td>Firm effect</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>Yes</td>
</tr>
<tr>
<td>Pseudo R²</td>
<td>0.233</td>
<td>0.288</td>
<td>0.233</td>
<td>0.257</td>
<td>0.779</td>
</tr>
</tbody>
</table>

Notes: P-value in parentheses. *p<0.10. **p<0.05. ***p<0.01.
The second variable to test was the public authority ownership, the impact of this variable is significantly positive. This result is consistent with our third hypothesis (H3), shows that the issuance is a response from companies to pressure from public authority investors who are increasingly interested in social and environmental issues to improve overall performance. This can be explained by the fact that the French government is already a leader in the development of “green finance”, France has launched in 2017 a government bond known as “green OAT” of 7 billion euros with a maturity of 22 years (Icher, 2017), which makes it the first issue benchmark sovereign in the green bond market and underlines the country’s leading role in the implementation of the Paris climate agreement signed in December 2015.

Furthermore, to assess our results, we added our financial variables lagged by 1 year (Bank, Insurance company, and Mutual funds in column (5). Firm effects were also included in column (5). Overall, the addition of firm effects improved the predictive ability of our model. Column (5) of Table 4 also provides similar results to previous findings, H2 and H3 seems to be consistent.

**Partial Least Square Discriminant Analysis**

We study the robustness of our findings in this section. By estimating our four-model using PLS-DA regression we will assess the consistency of our results. Our prior findings are qualitatively consistent, as can be shown in Table 5. The PLS regression enables all variables with higher explicative power to be retained in the model. The results of the PLS-DA regression are totally in line with the results displayed in Table 5. The VIP value of Leverage, size and ROA (VIP>0.8) is greater than Bank, Insurance company, Mutual funds and Public authority State, this means that the characteristics of the firm are the most important variables to predict the green bond issuance. When controlling the firm effect, the insurance company and the public authority ownership can affect the issuance of green bonds.

The results of PLS-DA estimation provide a deeper understanding of the complex relationship between variables, compared to traditional regression. In practice, where there is a high degree of multicollinearity, multiple regression is widely used (Jabeur, 2017). The disadvantage of this method is that it lacks defining elements that are directly related to the response variable and therefore important to the user. In the opposite, Throughout the procedure, the PLS-DA regression helps to hold all variables with a higher explanatory power.
### Table 5 - PLS-DA regression results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Classification function (Y=1)</th>
<th>VIP</th>
<th>Classification function (Y=1)</th>
<th>VIP</th>
<th>Classification function (Y=1)</th>
<th>VIP</th>
<th>Classification function (Y=1)</th>
<th>VIP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank</td>
<td>-0.0022</td>
<td>0.164</td>
<td>-0.0023</td>
<td>0.130</td>
<td>-0.0019</td>
<td>0.109</td>
<td>-0.0053</td>
<td>0.784</td>
</tr>
<tr>
<td>Insurance company</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mutual funds</td>
<td>-0.0101</td>
<td>0.930</td>
<td>-0.0100</td>
<td>0.932</td>
<td>-0.0102</td>
<td>0.932</td>
<td>0.0106</td>
<td>0.859</td>
</tr>
<tr>
<td>Public authority</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>State</td>
<td>1.55E-10</td>
<td>1.319</td>
<td>1.54E-10</td>
<td>1.321</td>
<td>1.57E-10</td>
<td>1.321</td>
<td>-0.0004</td>
<td>1.079</td>
</tr>
<tr>
<td>Leverage</td>
<td>0.0005</td>
<td>1.168</td>
<td>0.0004</td>
<td>1.170</td>
<td>0.00045</td>
<td>1.170</td>
<td>-1.656E-10</td>
<td>1.218</td>
</tr>
<tr>
<td>Constant</td>
<td>1.55E-10</td>
<td>0.167</td>
<td></td>
<td>0.166</td>
<td></td>
<td></td>
<td></td>
<td>0.862</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.178</td>
<td>0.177</td>
<td></td>
<td>0.180</td>
<td></td>
<td></td>
<td></td>
<td>0.226</td>
</tr>
</tbody>
</table>
Conclusion

This article examines the influence of certain structural ownership factors on the green finance innovation “green bonds”. Thin financial innovation plays an essential role in resolving financing restraints and provides policy support in green innovation, helping to achieve sustainable development. The contributions of this research are numerous. On a theoretical level, we developed a theoretical framework in which group legitimacy, stakeholder and slack resources theories help to understand the motivations for engaging with sustainability. Based on those theories, we analyze the impact of ownership structure on the decision of green bond issuance. Methodologically, we analyzed panel data, which simultaneously accounts for the dynamics of behaviors and their possible heterogeneity, which is not the case with time series. Empirically, the results showed that the French company’s ownership structure impacts the decision of green bonds issuance.

In addition, they show that institutional investors do not have the same impact on green bond issuance. The insurance companies are the most engaged in ecological transition. The influence of public authority shareholding helps support the political initiative of France as a leading player in the issues of climate change and environmental protection. Our findings are consistent with Maltais and Nykvist (2020) on the green bond issuance in Sweden, who found that the bottom-up growth of the green bond market is due to the robust matching of incentives between issuers and investors.

Also, using datasets covering all corporate green bond issuance worldwide, Tang and Zhang (2020) studied the impact of green bond issuance on the ownership structure and found that institutional ownership increased after green bond issuance. They concluded that green bonds help extend the investor base to improve media exposure. Our study focused on the impact of ownership structure on green bonds issuance. The findings of Tang and Zhang (2020) that existing shareholders derive net benefits from green bond issuance can explain our findings that some institutional investors (as shareholders) will push their companies to issue green bonds. They examined the impact of green bond issuance on two types of institutional investors (foreign investors and domestic investors) and found that institutional ownership, primarily from domestic institutions, increases after the company issues green bonds.

Our study sheds light on the heterogeneity of institutional investors by activity (Banks, Insurance, Mutual and pension funds). It was the first to study the role of State ownership in green bond issuance. Sangiorgi and Schopohl (2021) found that institutional investors prefer green bonds issued...
from corporate and sovereigns and that there is unmet solid investor demand for green bonds from non-financial corporates. Thus, they focus on the factors impacting institutional investors respondents’ decision to invest in a green bond. In our study, we focused on the role of institutional investors as shareholders and not as bondholders.

Our results have direct policy implications and suggest that an improvement in the role of the public authority as a shareholder could ultimately lead to more green bond issuers. The public authority could use channels other than tax-based incentives to enhance the green projects. Another implication for portfolio managers is that if they invest in a firm where the public authority or insurance company are substantial shareholders, they will benefit from green bond issuance. Green innovation is considered as one of the top solutions in the 21st century, which seeks to achieve the dual objectives of ecological preservation and low-carbon economic growth (Tolliver et al., 2021). Green finance plays an important role in resolving financing constraints and provides policy support in green innovation (Huang et al., 2022). Green bonds as financial innovation plays a crucial role in financing green innovations.

Future research must investigate the impact of ownership structure on the green innovations. Finally, the primary limitation of our work is linked to the use of a small sample. The green and climate bonds are new financial innovations, so issuers are still not substantial. However, this new financial innovation currently lacks solid criteria and benchmarks. In most cases, the issuer defines what is green and what is not without proper safeguards. Therefore, there is a real risk of “greenwashing,” which could disrupt the development of this emerging market. In addition, we believe that additional studies are required in the field of green bonds to investigate the importance of their development in relation to sustainability.

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